

PATTERNS OF FEEDING AND DIGESTION IN LOWER INVERTEBRATES

All living organisms require the presence of energy to do various activities of life. They get this energy from the nutrient they ingest. The nutrient is also needed for the growth and development of the body. The nutrition refers to sum total of all the processes concerned in the conversion of nutrients into the body stuffs to supply energy for various metabolic activities. The nutrition involves ingestion, digestion, absorption, assimilation and egestion (defaecation). The digestion includes conversion of non-diffusible foods into diffusible foods with the help of digestive enzymes.

The animals having tissues/organs grade body organization, no pores in the body wall and obvious mouth and digestive cavity are grouped as metazoan. On the basis of differentiation of germ layer and formation of coelom, metazoans are grouped as:

- (1) Porifera
- (2) Coelenterata
- (3) Ctenophora
- (4) Platyhelminthes
- (5) Nematode
- (6) Nemertinea
- (7) Entoprocta
- (8) Acanthocephala
- (9) Gastrotricha
- (10) Nematomorpha and
- (11) Rotifera

FEEDING AND DIGESTION IN PORIFERA

Sycon (= *Scypha*) is a filter feeder. It shows intracellular digestion. Food of *Scypha* includes bacteria, protozoans, diatoms and minute organic particles and dead organic matter present in the water. In radial canal these get attached to the outer surface of collar of choanocytes and slowly drawn in the cytoplasm forming a food vacuole.

The medium of food vacuole is first of all acidic and then it becomes alkaline. Digested food containing trypsin, pepsin, rennin,

erepsin, lipase, amylase, invertase are secreted from choanocytes and poured into the food vacuoles. Food may be incompletely digested in choanocytes and then passed in to the wandering amoebocytes. These amoebocytes carry digested food from one cell to other cell. Phagocytosis occurs by pinacocytes and porocytes.

In other sponges, the food as it passes through incurrent canals goes to amoebocytes directly. The digested food is stored there as glycogen, fat and glycoprotein.

FEEDING AND DIGESTION IN COELENTERATA

The coelenterates are radially or biradially symmetrical tentacles bearing metazoan without head, organ or system. They are diploblastic and possess nematocytes, enteron (=gastrovascular cavity), opening by the mouth. The enteron may be simple sac like, branched or divided by septa. Digestion is both intracellular and intracellular.

Obelia exhibits metagenesis with dominant polyp and medusa stages. These stages differ structurally and functionally.

Nutrition in polyp stage: Polyp (=hydranth, gastrozoid or feeding stage) is chiefly carnivorous feeding on crustaceans, nematodes, worms etc. The prey is seized and taken to mouth with the help of 24 solid tentacles arranged in a circle around the base of hypostome. The tentacles are armed with nematocytes. The gastrodermal cells secrete digestive juices which disintegrate the food. The enzymes are proteolytic enzymes, succinic dehydrogenase, DPNH dehydrogenase, TPNH dehydrogenase, esterase, acid phosphatase, alkaline phosphatase, ATPase, Glucose-6-phosphatase etc.

Now these foods are transferred to amoeboid cells where intracellular digestion occurs. In the presence of proteolytic enzymes, digestion of protein occurs in coelenterons. Now pseudopodia are emerged from broader parts of muscular cells by which semi digested foods come in contact of food vacuole by phagocytosis. The medium of food vacuole is firstly acidic and then becomes alkaline in which digestion is completed except the digestion of starch.

Nutrition in medusa stage: *Obelia* has an alimentary canal of mouth, gullet, stomach, radial canal and circular canal. Prey, feeding processes and digestion resemble these of polyp. However, prey is digested exclusively in the stomach. Sometimes, tentacular cells also ingest food particles.

FEEDING AND DIGESTION IN CTENOPHORA

The ctenophores are planktonic carnivorous. Their processes roughly resemble coelenterates. The food is captured either by rapping in a mucous sheet on the collobalsts of extended tentacles or moved into the mouth by ciliary action or simply by ingesting thorough open mouth while swimming with oral end foremost.

Digestion begins extracellularly in pharynx and completed intracellularly in the gastrovascular canals. The ciliated portion helps in circulating the food into the canals.

FEEDING AND DIGESTION IN PLATYHELMINTHES

They are acoelomate, triploblastic bilaterally symmetrical animals lacking anus. They have incomplete digestive system but altogether absent in acoela and cestoda.

Dugesia: In *Planarians*, digestion is both extra and intracellular as in coelenterates. They feed on dead or alive micro-organisms e.g., crustaceans, small worms, larvae, rotifers, dead bodies of large animals etc. They detect the presence of food from a distance due to presence of rhabdites. Its mouth leads into a buccal cavity opening into the pharynx which can be everted out as a fairly long proboscis to catch and engulf pray. After feeding proboscis is withdrawn inside a sheath and food passed in the intestine. The pharynx secretes proteolytic enzymes, which partially digest the prey before food is engulfed.

Some planarians suck the food through pharynx. The phagocytic cells of intestine engulf partially digested food which is further digested by intracellular endopeptidase in acidic medium. After about 8 hours, the vacuolar content becomes alkaline and digestion is completed by exopeptidase, lipase and carboxylase.

FEEDING AND DIGESTION IN NEMATODA

They are pseudocoelomate, triploblastic bilaterally symmetrical animals having usually straight alimentary canal which opens exteriorly by an anus. They generally lack digestive glands. The digestion is both intracellular and extracellular. It is reported that nematodes may be herbivores, carnivores or sarcophagous.

Ascaris: *Ascaris* gets digested or semi-digested food from its host intestine by sucking action of pharynx. The intestine contents are blood, food tissues, exudates etc. as the food is generally digested it does not need any further digestion. However, it can digest semi-digested food by means of enzymes of glandular cells of pharynx and intestine. In intestine, digestion of carbohydrates, protein and fats occurs.

FEEDING AND DIGESTION IN GASTROTRICHA

The food of gastrotriches contains bacteria, protozoa, diatoms etc. They keep on moving about seeking food rather continuously but some (like *Chaetonotus*) attached by adhesive tubes of the tail-fork and collect food. Apparently, digestion takes place in mid-gut lumen.

FEEDING AND DIGESTION IN ROTIFERA

Brachionus is a degenerate form lacking alimentary canal. It has a peculiar grinding organ or mastax containing tropharynx and muscular. Due to different feeding habit mastax becomes modified variously